MONTANA FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

Environmental Assessment of rotenone treatment of Gallatin Valley ponds for the purpose of removing smallmouth bass and restocking with appropriate sportfish species.

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action

Montana Fish, Wildlife & Parks proposes to use rotenone to eliminate known sources of smallmouth bass in ponds within the Gallatin Valley. Smallmouth bass would thrive in many area rivers and would be a detriment to wild trout populations that exist in these rivers. Of particular concern is smallmouth bass being introduced into the lower Madison River. Smallmouth bass would thrive in the lower Madison River due to the thermal characteristic as well as the high abundance of crayfish. Spread of smallmouth bass from the lower Madison River would likely result in smallmouth bass establishment in the Gallatin River, East Gallatin River, Jefferson River, Upper Missouri River, and potentially the Big Hole and Beaverhead rivers. Smallmouth bass are effective predators on juvenile salmonids (well documented in pacific salmon) and would likely cause irreparable impacts to wild trout populations in these rivers if they escape or are moved from valley ponds into area rivers. This proposed action has the potential to cover both enforcement actions (known unauthorized introductions of smallmouth bass) and invasive species spread prevention actions (where unauthorized introductions of smallmouth bass have occurred, but no known individual or group can be identified as responsible for the introduction). In both situations, the removal efforts are to prevent future unauthorized introductions of smallmouth bass to sensitive (blue-ribbon trout rivers, lakes and reservoirs) and economically important fisheries.

B. Agency Authority for the Proposed Action
Montana Fish, Wildlife & Parks, Region 3 Fisheries Division

87-1-702. Powers of department relating to fish restoration and management.
The department is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects as defined and authorized by the act of Congress, provided every project initiated under the provisions of the act shall be under the supervision of the department, and no laws or rules or regulations shall be passed, made, or established relating to said fish restoration and management projects except they be in conformity with the laws of the State of Montana or rules promulgated by the department, and the title to all lands acquired or projects created from lands purchased or acquired by deed or gift shall vest in, be, there remain in the State of Montana and shall be operated and maintained by it in accordance with the laws of the State of Montana. The department shall have no power to accept benefits unless the fish restoration and management projects created or established shall wholly and permanently belong to the state of Montana, except as hereinafter provided.

C. Estimated Commencement Date
April 2019 for a 5-year period

D. Name and Location of the Project

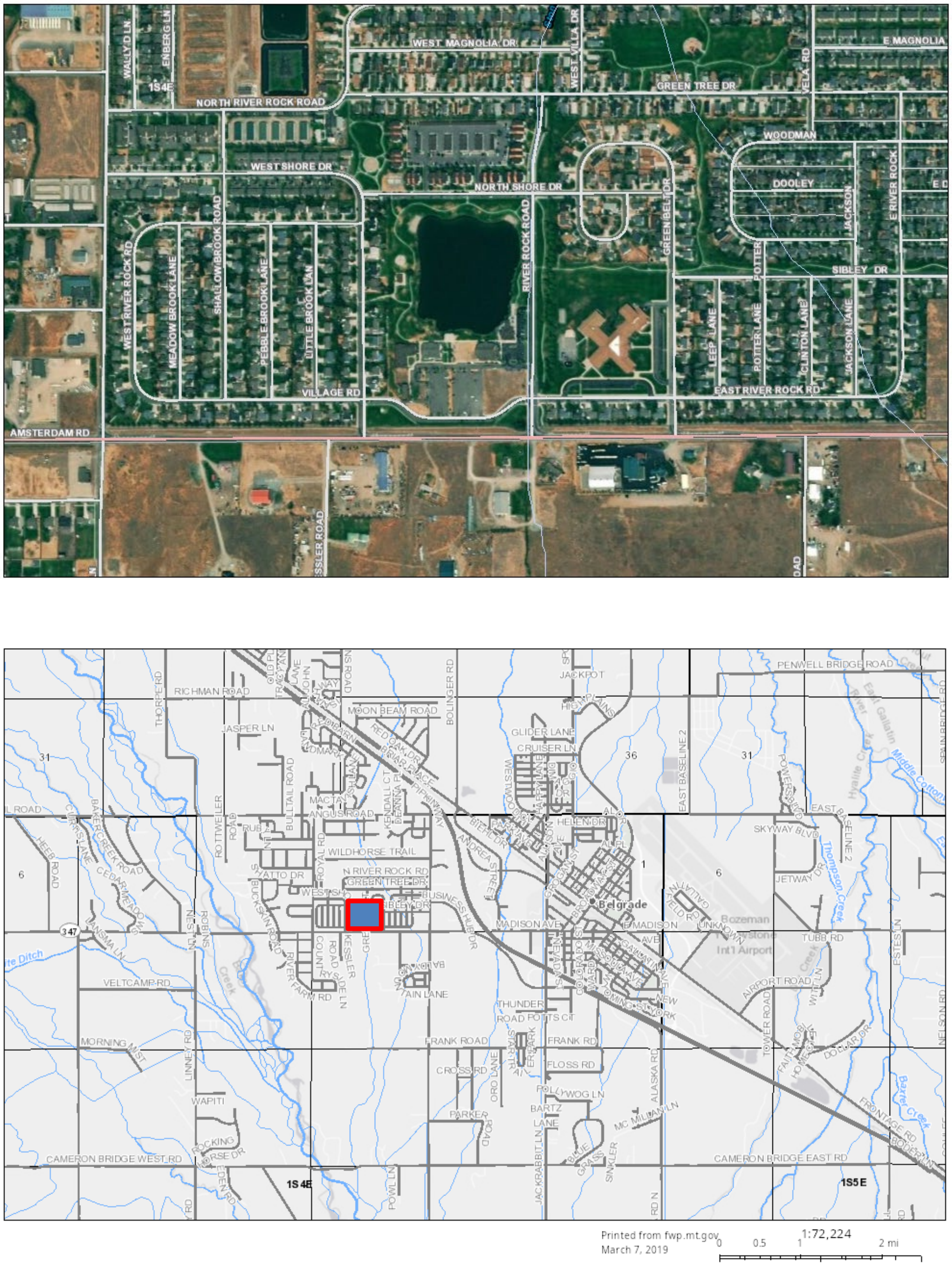
Environmental Assessment of rotenone treatment of Gallatin Valley Ponds for the purpose of removing smallmouth bass and restocking with appropriate sportfish species.

The Gallatin Valley has many urban community ponds, subdivision ponds, and private ponds. In the past, the illegal introduction of bass, bluegill, and largemouth bass has been demonstrated to affect most public ponds in the Gallatin Valley, and some private ponds. The proposed action is to use rotenone to eliminate known sources of smallmouth bass in ponds within the Gallatin Valley. This Programmatic Environmental Assessment provides review of the action impacts for all artificial ponds in the Gallatin Valley with regard to the Montana Environmental Policy Act. Currently, FWP is aware of one public pond that has smallmouth bass. The project site is located in Gallatin County adjacent to Belgrade, Montana, directly southwest of Belgrade, Montana; T01S, R04E, Sec_3 (Figure 1). FWP has reports of two private ponds in the Gallatin Valley with smallmouth bass, but confirmatory sampling needs to be conducted. Finally, FWP used Environmental DNA testing to screen for the presence of smallmouth bass in most Gallatin Valley Public Ponds; however, only the pond in Belgrade (already known) came back positive. If other waters are confirmed to have smallmouth bass, this environmental assessment will be used to remove those sources using rotenone.

E. Project Size (acres affected)
1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian –

The pond in the Red Rock Subdivision is approximately 8 surface acres in size, has a maximum depth of 25 feet and is 80- to 100-acre feet in volume, the exact volume would be determined prior to treatment of ponds. The pond is lined with an impermeable liner and has no functioning inlets or outlets for surface water. The pond is filled from a groundwater well.

1. Floodplain – 0 acres
2. Irrigated Cropland – 0 acres
3. Dry Cropland – 0 acres
4. Forestry – 0 acres
5. Rangeland – 0 acres



This map was generated from the Montana Fish, Wildlife & Parks (FWP) internal FWP Mapper online mapping system. Data layers on this map may depict sensitive species level information. This map is not intended for distribution or use beyond work associated with FWP.

Some layers may not appear in the legend due to page size limitations.

Figure 1. Map of the project area

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

The proposed action is to use rotenone to eliminate known sources of smallmouth bass in ponds within the Gallatin Valley. Smallmouth bass would thrive in many area rivers and would be a detriment to wild trout populations that exist in these rivers. Of particular concern is smallmouth bass being introduced into the lower Madison River. Smallmouth bass would thrive in the lower Madison River due to the thermal characteristics as well as the high abundance of crayfish. Spread of smallmouth bass from the lower Madison River would likely result in smallmouth bass establishment in the Gallatin River, East Gallatin River, Jefferson River, Upper Missouri River, and potentially the Big Hole and Beaverhead rivers. Smallmouth bass are effective predators on juvenile salmonids (well documented in pacific salmon) and would likely cause irreparable impacts to wild trout populations in these rivers. In the Gallatin Valley, all smallmouth bass population are unauthorized introductions as FWP has never stocked the species in the area. The proposed removal efforts are to prevent future unauthorized introductions of smallmouth bass to sensitive (blue-ribbon trout rivers, lakes, and reservoirs) and economically important fisheries.

The proposed project is intended to remove smallmouth bass from Gallatin Valley ponds found to have smallmouth bass using the EPA-registered fish toxicant rotenone. Rotenone is a commonly used piscicide that targets fish. Rotenone has no impact on terrestrial plants and animals and has limited impacts to non-target aquatic organisms (aquatic insects and larval amphibians) at fish killing concentrations. FWP has used rotenone to manage fish populations in Montana waters since 1948, primarily for the purpose of native fish conservation; but also, for management of warmwater lakes and ponds in central and eastern Montana.

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family (*Derris* spp.) and (*Lonchocarpus* spp.) that are found in Australia, southern Asia, and South America. Indigenous people of these areas have utilized these plants to capture fish for centuries. Rotenone has been used in fisheries management in North America since the 1930s.

Rotenone inhibits oxygen transfer at the cellular level. It is effective at low concentrations with fish and other gill breathing organisms, as it is readily absorbed across the thin cell layer of the gills into the bloodstream. As such, negative impacts on larval amphibians and aquatic invertebrates can result. Although larval amphibians may be affected by rotenone, air-breathing adult amphibians are not affected by rotenone at fish killing concentrations (Billman et al. 2011, 2012). Impacts to aquatic invertebrates have been shown to be temporary. While significant reductions in aquatic invertebrates can follow rotenone application, populations have been shown to recover within a year or two. Non-gill breathing organisms, such as mammals and birds, exhibit no effects to rotenone at fish killing concentrations because they do not possess the absorption route to bloodstream. The most common route of exposure to non-gill breathing animals is through ingestion. Rotenone is not well absorbed in the digestive tract and is readily broken down by digestive processes; thus, terrestrial animals can tolerate exposure to concentrations much higher than those used to kill fish.

Product (5% rotenone) treatment concentration in ponds with tolerant species (e.g. carp, bass) is between 2 - 4 parts per million parts water (2 to 4 ppm). The concentration of active rotenone is 100 to 200 parts per billion parts water. The concentration of active rotenone is 1 part to 50 billion parts water. The rotenone product proposed for use in the Gallatin Valley is CFT Legumine (5% rotenone). Groundwater upwelling areas in ponds may also be treated with the powder formulation of rotenone (Prentox, 7% rotenone) or a sand/powder mix to prevent fish from seeking these areas as freshwater refuges during the application. Rotenone would be applied to Gallatin Valley ponds either by pumping it under the ice, or dispersal using a boat and a pump. The total amount of chemical to be applied to pond or lake is dependent volume of the pond and the decomposition rate expected of the rotenone. Depending on application conditions, it is expected that fish killing concentrations of CFT Legumine will be present under ice for an extended period after application, in open water situations wind action, interaction with organic sediments, and exposure to sunlight would break rotenone down more quickly.

Rotenone can be detoxified through natural oxidation, dilution by freshwater and introduction of a neutralizing agent such as potassium permanganate. Detoxification of rotenone with potassium permanganate will not be required in ponds with no inlets or outlets.

FWP is confident in being able to remove 100% of smallmouth bass in any Gallatin Valley Ponds and will conduct sampling after rotenone treatment to confirm the removal. In some cases, multiple rotenone treatments may be required for 100% removal. Once the pond has been confirmed to be void of smallmouth bass and rotenone has detoxified (confirmed using sentinel fish), FWP will restock the pond with catchable-sized rainbow trout or other appropriate sportfish.

To minimize the risk of the public being exposed to rotenone or treated waters, any project area would be posted with signs until sentinel fish deployment confirms that the chemical has been detoxified. Signs will be placed around the pond informing the public of treated waters and to keep out during rotenone application.

<u>Funding</u>

Project personnel expenses, rotenone, and supplies and materials will be covered under standard FWP budgets as a part of normal duties.

Marking and Bills (1976) found that smallmouth bass required concentrations between 2 and 4 ppm of 5% product. This concentration should also be effective in removing carp, goldfish, largemouth bass, yellow perch, bluegill, and suckers. Pre-treatment sampling would be conducted to determine pond volume prior to commencement of rotenone treatment.

Caged fish will be used to measure the toxicity of the water in any Gallatin Valley Pond to ensure the objectives have been met. After the application, FWP will use caged fish to evaluate when the waters are no longer toxic to fish and when fish can be restocked. *The rotenone label specifies that once caged fish survive 24 hours in treated lake water, it is considered detoxified and is safe for restocking.*

Part II. ALTERNATIVES

Alternative 1 – No action

The no-action alternative would result in at least one smallmouth bass population in Southwestern Montana being allowed to persist. As a result, a continued threat would exist that smallmouth bass would be easily introduced into other area waters. Unauthorized introductions of various fish species have been documented throughout the Flathead Valley in Montana over the past six decades (Figure 2). In that region, hundreds of unauthorized introductions have been documented involving bass, bluegill, perch, and crappies. A smaller version of the same issue has been observed in the Gallatin Valley. In the 1970's, Montana FWP stocked largemouth bass into the Three Forks Ponds, near Three Forks, Montana. Since that first introduction, FWP has confirmed the spread of largemouth bass to nearly every public pond in the Gallatin Valley including a report of largemouth bass in Hyalite Reservoir. Largemouth bass are less of a concern since they do not typically do well in riverine environments, in particular free-stone snow-melt driven western rivers. FWP has several reports of largemouth bass in private ponds as well. In addition to largemouth bass, yellow perch and bluegill have been spread similarly to what has been observed for largemouth bass.

Alternative II – Proposed action: rotenone treatment of Gallatin Valley Ponds for the purpose of removing smallmouth bass and restocking with appropriate sportfish species.

This alternative, as described above, would allow FWP to eliminate local sources of smallmouth bass and prevent their spread into other waters. This alternative is the best approach to protect trout populations throughout the upper Missouri River system, and the economics of trout fishing in the area.

Under the proposed action, there would be some loss of angling opportunity between when smallmouth bass are removed and when appropriate sportfish are restocked.

Alternative III –Mechanical removal and restocking with rainbow trout.

This alternative would involve using various techniques (nets, traps, electrofishing, etc.) to remove the unwanted species of fish, then stocking trout to improve angling quality.

FWP is aware of a few situations where mechanical removal (gill nets, trap nets, or electrofishing) have been used to successfully remove fish species from a pond or lake; however, these examples have involved trout species. In general, this approach requires large amounts of effort (10,000 net nights) due to inefficiency of the techniques in relationship to the size of the waterbody. Smallmouth bass tend to avoid some net types. Many juvenile fish would not be captured in the nets, and electrofishing does not effectively capture fish beyond a few feet in depth. Nets would need to be deployed for extended periods of time (months or years) and would pose an entanglement and drowning risk to the public swimming in the pond. With public knowledge of smallmouth bass presence in a few Gallatin Valley ponds, the risk of movement of this fish to other waters is too high for the removal action to take months or longer. In summary,

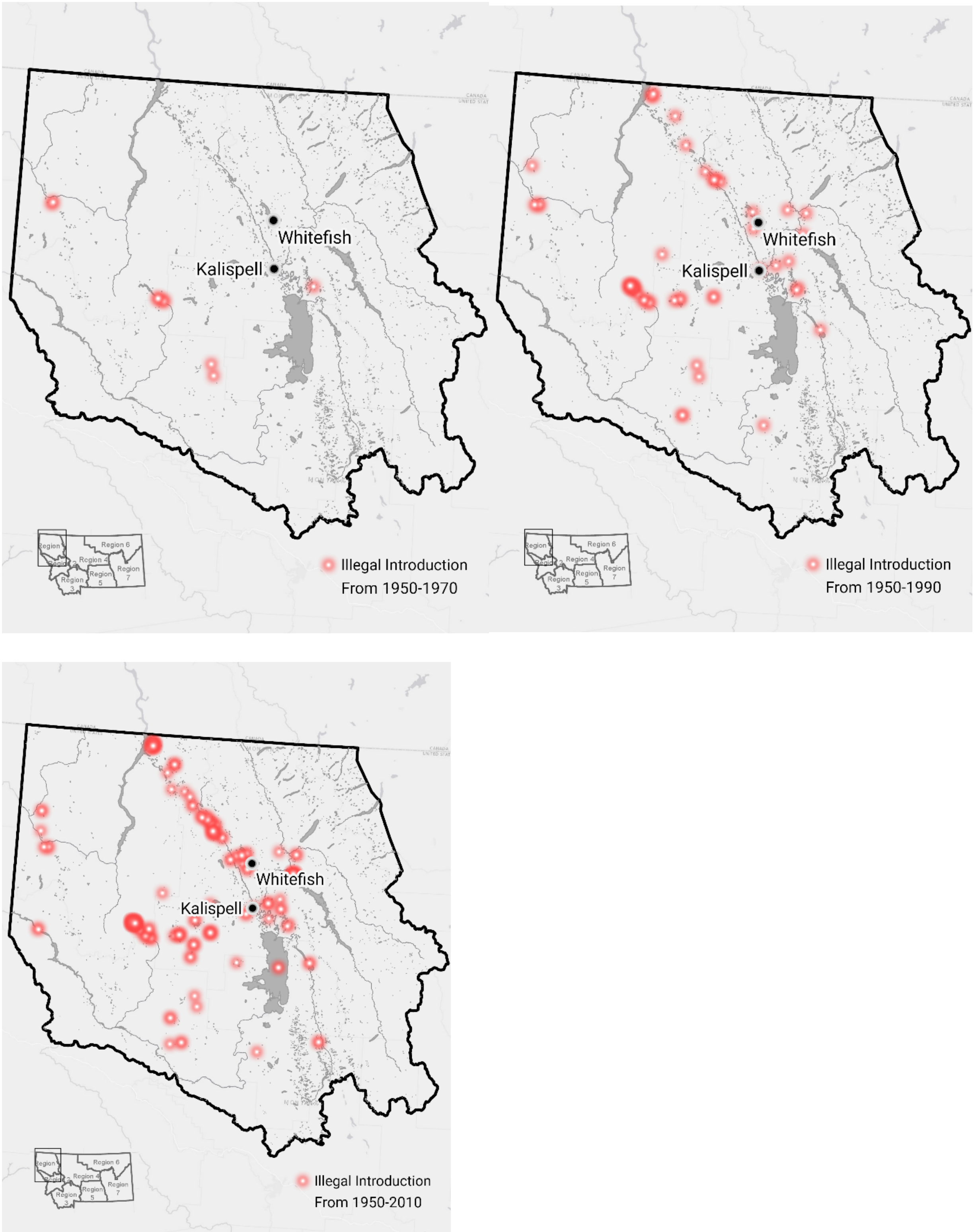


Figure 2. Expansion of warm water fish species (bass, perch, bluegill and crappies) via illegal introductions in the Flathead Valley since 1950.

the goal of removing the source and thereby risk of smallmouth bass from the Gallatin Valley is not feasible or effective with this alternative.

Gill netting has been used successfully to remove unwanted fish from lakes. Bighorn Lake, a 5.2-acre lake located in Banff National Park in Alberta, Canada, was gillnetted from 1997 to 2000 to remove an unwanted population of brook trout (Parker et al. 2001). Over 10,000 net nights (1 net night = 1 net set overnight for at least 12 hours) were conducted over a four-year period in Bighorn Lake to remove the population which totaled 261 fish. The researchers concluded that the removal of nonnative trout using gill nets was impractical for larger lakes (> 5 acres). In clear lakes, trout can become acclimated to the presence of gill nets and avoid them. These researchers reported observing brook trout avoiding gill nets within about 2 hours of being set. It is not known how smallmouth bass would respond to gill netting intended for complete removal, but smallmouth bass are known to be more territorial than trout.

Knapp and Matthews (1998) reported that Maul Lake, a 3.9-acre lake in the Inyo National Forest in California, was gill netted from 1992 to 1994 to remove a population of brook trout. The population, which totaled 97 fish, was successfully removed with an effort of 108 net days. The researchers reported that following the removal of brook trout from Maul Lake it was mistakenly restocked with rainbow trout. Efforts to remove them using gill nets were implemented immediately. From 1994 through 1997, 4,562 net days were required to remove the 477 rainbow trout from the lake. These researchers reported that gill nets could be used as a viable alternative to chemical treatment. They acknowledged that the small size and shallow depth of Maul Lake were conditions that allowed a successful fish eradication using gill nets. Their criteria for successful fish removal using gill nets include lakes less than 3.9 surface acres, less than 19 feet deep, with little or no inflow or outflow to perpetuate reinvasion, and no natural reproduction. Although not tested, the maximum size of a lake that they felt could be depopulated using gill nets was 7.4 surface acres and 32 feet deep.

The Montana Bull Trout Scientific Group concluded that gill netting would not result in a complete removal of fish that compete with bull trout (FWP 1996). Rather, they recommended that it be used as a suppression technique. In very specific circumstances, this method could lead to total removal.

Deploying gill nets and traps requires frequent presence at the site to check and reset nets. There would be an incredible time commitment required to attempt this method of fish removal. Due to these considerations and expected incomplete results, this alternative has a low probability of meeting the objectives.

Alternative IV– Using Angling to reduce the number of smallmouth bass in Gallatin Valley Ponds then restocking with approved game fish species.

FWP has the authority under commission rule to modify angling regulations for the purpose of removing unwanted fish from a lake or stream. The amount of time required for anglers to depress or remove all fish from a lake or stream would likely require many years to accomplish. For these reasons, this method of fish removal was considered unreliable at achieving the objective of complete fish removal from lakes and streams and was eliminated from further analysis.

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?		X				
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. WATER Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		YES	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		YES	see 2a f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X			See 2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				

l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		YES	2m

Comment 2a

The proposed project is designed to intentionally introduce a piscicide to surface water to remove unwanted fish. The impacts would be short term and minor. Prenfish (5% liquid), Prentox (7% powder), or CFT Legumine 5% liquid) rotenone are EPA registered piscicides and are safe to use for removal of unwanted fish, when handled properly. The proposed concentration is 2 -4 ppm of diluted product.

There are three ways in which Rotenone can be detoxified once applied. The most common method is to allow natural breakdown to occur. Rotenone is a compound that is susceptible to natural breakdown (detoxification) through a variety of mechanisms such as water chemistry, water temperature, exposure to organic substances, exposure to air, and sunlight intensity (Ware 2002; ODFW 2002; Loeb and Engsrtom-Heg 1970; Engstrom-Heg 1972; Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46°F the half-life ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 ppm) in 46°F pond water 14 days after a treatment. By day 18, the concentrations were sub-lethal to trout. The second method for detoxification involves basic dilution by fresh water. This may be accomplished by fresh ground water or surface water flowing into a lake or stream. The final method of detoxification involves the application of an oxidizing agent like potassium permanganate. This dry crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to detoxify the rotenone. Detoxification is accomplished after about 15-30 minutes of exposure time between the two compounds (Prentiss Inc. 1998, 2007). Most Gallatin Valley ponds are lined and have no inlet or outlet. If FWP is able to apply the rotenone under the ice and mix it with the aeration system, a period of time will pass between application of Rotenone and ice off, so the rotenone will likely have detoxified some during that period. Once the ice is off, the aeration system would be run to continue to circulate the pond water and expose it to sunlight. FWP anticipates that the rotenone would be detoxified within a few weeks of ice off. If FWP uses rotenone to remove smallmouth bass from other Gallatin Valley Ponds, the specifics of those ponds will be considered to determine the need for detoxification.

Dead fish would result from this project. Bradbury (1986) reported that approximately 70% of rotenone fish killed in Washington lakes never surface. Although no trout were involved with his study, Parker (1970) reported that at water temperatures of 40°F and less, dead fish required 20-41 days to surface. The most important factors inhibiting fish from ever surfacing are cooler water (<50°F) and deep water (>15 feet). If dead fish on the shoreline is a problem, FWP will organize volunteers to collect and properly dispose of dead fish. Bradbury (1986) reported that 9 of 11 water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This is attributed to the input of phosphorus to the water as a result of decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock would be released into the lake through bacterial decay. This action stimulates phytoplankton production, then zooplankton production, and starts the lake toward production of food for fish. This change in water chemistry is viewed as a benefit to stimulate plankton growth. Any changes or impacts to water quality resulting from decaying fish would be short term and minor.

Comment 2f

No contamination of groundwater is anticipated to result from this project. Rotenone binds readily to sediments and is broken down by soil and in water (Skaar 2001; Engstrom-Heg 1971, 1976; Ware 2002). Rotenone moves only one inch in most soil types; the only exception would be sandy soils where movement is about three inches (Hisata 2002). In California, studies where wells were placed in aquifers adjacent to and downstream of rotenone applications have never detected rotenone, rotenolone, or any of the other organic compounds in the formulated products (CDFG 1994). Case studies in Montana have concluded that rotenone movement through groundwater does not occur. For example, at Tetrault Lake, Montana neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after applying 90 ppb rotenone to the lake. This well was chosen because it was down gradient from the lake and also drew water from the same aquifer that fed and drained the lake. In 1998, a Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well, located 65 feet from the pond, was analyzed and no sign of rotenone was detected. In 2001, another Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 200 feet from that pond was tested four times over a 21-day period and showed no sign of contamination. In 2005, FWP treated a small pond near Thompson Falls with Prenfish to remove pumpkinseeds and bass. A well located 30 yards from the pond was tested and neither Prenfish nor inert ingredients were found in the well.

Because ground water leaving Gallatin Valley Ponds must travel through lake sediments, soil, and gravel, and rotenone is known to bind readily with these substances, no contamination of groundwater would occur. In addition to pond sediments, soil and gravel, some Gallatin Valley ponds may be lined to prevent interaction between pond water and groundwater.

Inert ingredients in both Prenfish and CFT Legumine volatilize rapidly in the environment by both photolysis and hydrolysis and therefore do not pose a threat to the environment at the levels proposed for fish eradication.

Comment 2j

The (CFT Legumine) label states (> 0.8 ppm 5 % rotenone formulation) in waters with drinking water intakes or hydrologic connections to wells, 7 to 14 days prior to application, the Certified Applicator or designee under his/her direct supervision must provide notification to the party responsible for the public water supply or individual private water users against the consumption of treated water until: (1) active rotenone < 0.04 ppm as determined by analytical chemistry, or (2) fish of the Salmonidae or Centrarchidae families can survive for 24 hours, or (3) dilution with untreated water yields a calculation that active rotenone is < 0.04 ppm, or (4) distance or travel time from the application sites demonstrates that active rotenone is < 0.04 ppm. See Rotenone SOP Manual (SOP 16) for guidance on notification and bioassay and chemical analysis techniques and dilution, distance, and travel time criteria.

Comment 2m
FWP would apply for an exemption of surface water quality standards for the purpose of applying a piscicide from Montana DEQ under section 308 of the Montana Water Quality Act.

3. AIR **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))			X			3a
b. Creation of objectionable odors?			X		yes	3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge which will conflict with federal or state air quality regs?		X				

Comment 3a
Emissions from outboard motors or generators used during the application of rotenone would be created but are expected to dissipate rapidly. Any impacts from these odors would be short term and minor.

Comment 3b
Prenfish liquid formulated rotenone does contain aromatic solvents that make it soluble in water. The smell of these solvents, primarily naphthalene, may last for several hours to several days, depending on air and water temperatures and wind direction. These relatively heavy organic compounds tend to sink (remain close to the ground) and move downwind. The California Department of Piscicide Regulation (CDPR 1998, cited in Finlayson et al. 2000) found no health effects from this smell. Applicators would have the greatest contact with these odors but would be protected because they would be wearing respirators as the product label recommends. Any impacts caused by objectionable odors would be short term and minor.

CFT Legumine does not contain the same level of aeromatic petroleum solvents (toluene, xylene, benzene and naphthalene) of other rotenone formulations and as a consequence does not have the same odor concerns and has less inhalation risks.

Dead fish would result from this project and may cause objectionable odors. This would be mitigated by collecting and/or sinking dead fish in the ponds if dead fish are found on the shoreline and causing odors. FWP would expect odors from dead fish to be short term and minor.

4. VEGETATION Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?		x				
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands, or prime and unique farmland?		X				

5. FISH/WILDLIFE Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		yes	5b
c. Changes in the diversity or abundance of nongame species?			X		yes	5c
d. Introduction of new species into an area?			X			5d
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?	X					5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				5g
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)			X			See 5d

Comment 5b

This project is designed to kill unwanted fish. An unauthorized introduction of smallmouth bass into Gallatin Valley ponds has resulted in a significant threat to Upper Missouri River Basin trout river due to continued unauthorized movements. Smallmouth bass would cause harm to wild trout populations in rivers such as the Madison, Jefferson, Gallatin, and East Gallatin rivers. There is potential for smallmouth bass to pioneer as far as the Big Hole and Beaverhead rivers. FWP proposes to replace smallmouth bass with appropriate sportfish in any Gallatin Valley pond.

Comment 5c
In many situations with Gallatin Valley ponds, FWP does not have an inventory of what fish species have been introduced. There would be some mortality of non-game (non-target) species that would be temporarily impacted including zooplankton, some aquatic insects, crustaceans (crayfish), most fish species, and possibly some amphibians; however, this impact would be short term and nutrients released by decaying fish would bolster the invertebrate populations quickly.

Numerous studies indicate that rotenone has temporary or minimal effects on aquatic insects and plankton. Anderson (1970) reported that comparisons between samples of zooplankton taken before and after a rotenone treatment did not change a great deal. Despite the inherent natural fluctuations in zooplankton communities, the application of rotenone had little effect on the zooplankton community. Cook and Moore (1969) reported that the application of rotenone has little lasting effect on the non-target insect community of a stream. Kiser et al. (1963) reported that 20 of 22 zooplankton species re-established themselves to pre-treatment levels within about 4 months of a rotenone application. Cushing and Olive (1956) reported that the insects in a lake treated with rotenone exhibited only temporary effects. Hughey (1975) concluded that three Missouri ponds treated with rotenone showed little short term and no long-term effect on population levels of zooplankton. The effects of rotenone on plankton were consistent with the natural variability that is characteristic of plankton populations, and re-colonization was rapid and reached near pre-treatment levels within eight months.

Both Anderson (1970) and Kiser et al. (1963) reported that most zooplankton species survive a rotenone treatment via their highly resilient egg structures. In addition, parthenogenesis of some female plankton occurs, causing sexual dimorphism, which greatly increases plankton density in times of population distress. Among the aforementioned studies, variation in climate, physical environment, and water chemistry would likely cause subtle differences in results in other areas. Case studies conducted on Devine Lake in the Bob Marshall Wilderness from 1994-1996 indicate that invertebrates actually increased in number and very slightly increased in diversity following a rotenone treatment (Rumsey et al. 1996). This is supported by observations made by Cushing and Olive (1956), who reported that oligochaetes (worms) increased in number after a rotenone treatment then became stable. *Gammarus* species (fresh water shrimp), a common fish food item, were detected in Devine Lake only when fish were present. Neighboring Ross Lake, in the Bob Marshall Wilderness, is fishless and was used to measure natural insect and plankton variation during the Devine Lake treatment and evaluation. *Gammarus* species were never detected in Ross Lake, although it is fishless. Invertebrate numbers in Ross Lake were reported to be relatively stable, but the diversity of insects fluctuated considerably over time. Many studies report that aquatic insects are much less sensitive to rotenone treatment than fish (Schnick 1974). Houf and Campbell (1977) reported no short term or long-term effects on species abundance or insect emergence in three ponds treated with 0.5 to 2.0 mg/L of Noxfish 5% rotenone. In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization. Aquatic invertebrates in general are capable of rapid recovery from disturbance (Matthaei et al. 1996).

In regard to zooplankton, Schnee (2007b) chronicled two years of post-rotenone treatment monitoring for upper and lower Martin lakes near Olney, Montana, that were treated in 2005. He concluded that zooplankton density two years after the treatment were similar to pre-treatment densities, and in some cases higher (see tables below). Zooplankton community composition showed no change between 2006 and 2007. Based on this, we would expect the plankton species composition in Gallatin Valley ponds to return to pre-treatment diversity and abundance within two years.

Schnee (2007b) concluded that that rotenone's effects on non-target organisms such as plankton, amphibians, reptiles, and aquatic insects were temporary and natural reproduction and/or recolonization by these species was sufficient to restore populations to pre-treatment densities within two years.

Since Gallatin Valley ponds covered under this EA are manmade, there are no concerns for unique or rare species, and FWP is confident that within a year the invertebrate community will have returned to the same levels prior to the rotenone treatment.

Mammals are generally not affected because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Laboratory tests by Marking (1988) fed forms of rotenone to rats and dogs as part of their diet for periods of six months to two years and observed effects such as diarrhea, decreased food consumption, and weight loss. He reported that despite unusually high treatment concentrations of rotenone in rats and dogs, it did not cause tumors or reproductive problems in mammals. Studies of risk for terrestrial animals found that a 22-pound dog would have to drink 7,915 gallons of treated lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose (CDFG 1994). The State of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to be receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume the compound under field conditions is by drinking lake or stream water, a half-pound animal would need to drink 33 gallons of water treated at 2 ppm.

The EPA (2007) made the following conclusion for small mammals and large mammals;

> *When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (39.5 mg/kg * 0.350 kg = 13.8 mg = 13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g *1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30.4 mg/kg * 1 kg = 30.4 mg = 30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish*

were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.

One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the results have been challenged on the basis of methodology: (1) that the continuous intravenous injection method used leads to "continuously high levels of the compound in the blood," and (2) second, that dimethyl sulfoxide (DMSO) was used to enhance tissue penetration (normal routes of exposure actually slow introduction of chemicals into the bloodstream). Finally, injecting rotenone into the body is not a normal way of assimilating the compound. Similar studies (Marking 1988) have found no Parkinson-like results. Extensive research has demonstrated that rotenone does not cause birth defects (HRI 1982), gene mutations (Van Geothem et al. 1981; BRL 1982) or cancer (Marking 1988). Rotenone was found to have no direct role in fetal development of rats that were fed excruciatingly high concentrations of rotenone. Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1000 ppm rotenone over a 10-day period did not suffer any reproductive dysfunction. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppm and are far below that administered during most toxicology studies.

Similar results determined that birds required levels of rotenone at least 1,000 to 10,000-times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants, and members of lower orders of *Galliformes* were quite resistant to rotenone, and four-day old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone and it is slightly toxic to wildfowl, but to kill Japanese quail required 4500 to 7000 times more than is used to kill fish.

The EPA (2007) made the following conclusion for birds;

Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds will contain rotenone residues from this use. While it is possible that some piscivorous birds may feed opportunistically on dead or dying fish located on the surface of treated waters, protocols for piscicidal use typically recommend that dead fish be collected and buried, rendering the fish less available for consumption (see Section IV). In addition, many of the dead fish will sink and not be available for consumption by birds. However, whole body residues in fish killed with rotenone ranged from 0.22 µg/g in yellow perch (Perca flavescens) to 1.08 µg/g in common carp (Cyprinus carpio) (Jarvinen and Ankley 1998). For a 68 g yellow perch and an 88 g carp, this represents totals of 15 µg and 95 µg rotenone per fish, respectively. Based on the avian subacute dietary LC_{50} *of 4110 mg/kg, a 1000-g bird would have to consume 274,000 perch or 43,000 small carp. Thus, it is unlikely that piscivorous birds will consume enough fish to result in a lethal dose.*

Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation), and Southern Leopard frog tadpoles were between 3 and 10 times more tolerant than fish. Grisak et al. (2007) conducted laboratory studies on longtoed salamanders, Rocky Mountain tailed frogs, and Columbia spotted frogs and concluded that the adults of these species would not suffer an acute response to Prenfish at trout killing concentrations (0.5-1 mg/L) but the larvae would likely be affected. These authors recommended implementing rotenone treatments at times when the larvae are not present, such as the fall, to reduce the chance of exposure to rotenone treated water and potential impacts to larval amphibians.

It is important to note that many toxicity studies involve subjecting laboratory specimens to unusually high concentrations of rotenone or conducting tests on animals that would not normally be exposed to rotenone during use in fisheries management.

Based on this information, we would expect the impacts to non-target organisms to range from non-existent to short term and minor.

Comment 5d
Gallatin Valley ponds that have smallmouth bass would be stocked with appropriate game fish as needed.

Comment 5f
Dead fish would result from any Gallian Valley pond project. Most Gallatin Valley ponds are artificial and do not have threatened, endangered, or sensitive species. Prior to treatment of Gallatin Valley ponds to remove smallmouth bass, FWP will consult with nongame and sensitive species experts to evaluate and mitigate any anticipated negative effects.

Comment 5g
FWP does not anticipate any impact to wildlife species. Prior to any Gallatin Valley ponds being treated to remove smallmouth bass, FWP will consult with wildlife biologist to evaluate and mitigate any anticipated negative effects to other wildlife.

Comment 5i
Gallatin Valley ponds that have smallmouth bass will be stocked with appropriate game fish as needed after treatment, by FWP.

B. HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?			X			6a
b. Exposure of people to serve or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

Comment 6a
Noise generated from this project would be from an outboard motor or generator. The noise generated from this would be short term and minor.

7. LAND USE Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?	X					7c
d. Adverse effects on or relocation of residences?		X				

Comment 7c
Any rotenone treatment of a Gallatin Valley pond would result in a short-term loss of recreational opportunity on the pond. FWP would post the pond with signs telling the public not to enter the water until the sentinel fish survival demonstrates that rotenone is gone from the water. In addition, angling opportunity will be affected for a short period of time. If rotenone is pumped under the ice and is gone shortly after ice off, there likely will not be any effect on aquatic recreation since this seasonal activity would not have started. Ice fishing in the pond or immediately after ice-off would be limited due to the species of fish existing in the pond. Smallmouth bass are dormant over winter and difficult to catch through the ice. Once FWP restocks the pond with appropriate sportfish, a fishery will be restored. FWP anticipates that the resulting fisheries will be improved, since warmwater fish species in the Gallatin Valley are limited by short growing season and minimal prey base. In FWP's experience, warmwater species in Gallatin Valley ponds over populate and become stunted and are less desirable to anglers.

8. RISK/HEALTH HAZARDS Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, piscicides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		YES	8b
c. Creation of any human health hazard or potential hazard?			X		YES	see 8ac
d. Will any chemical toxicants be used?			X		YES	see 8a

Comment 8a
The principal risk of human exposure to hazardous materials from this project would be limited to the applicators. All applicators would wear safety equipment required by the product labels and MSDS sheets such as respirator, goggles, rubber boots, Tyvek overalls, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. At least one, and most likely several, Montana Department of Agriculture certified piscicide applicators would supervise and administer the project. Materials would be transported, handled, applied, and stored according to the label specifications to reduce the probability of human exposure or spill.

Comment 8b
FWP requires a treatment plan for rotenone projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, spill contingency plan, first aid, emergency responder information, personal protective equipment, monitoring and quality control, among others. Implementing this project should not have any impact on existing emergency plans. Because an implementation plan has been developed by FWP, the risk of emergency response is minimal and any affects to existing emergency responders would be short term and minor.

Comment 8c
The EPA (2007) conducted an analysis of the human health risks for rotenone and concluded it has a high acute toxicity for both oral and inhalation routes but has a low acute toxicity for dermal route of exposure. It is not an eye or skin irritant nor a skin sensitizer. The EPA could not provide a quantitative assessment of potentially critical effect on neurotoxicity risks to rotenone users, so a number of uncertainty factors were assigned to the rating values. They are; an additional 10x database uncertainty factor - in addition to the inter-species (10x) uncertainty factor and intra-species (10x) uncertainty factor – has been applied to protect against potential human health effects and the target margin of exposure (MOE) is 1000. The following table summarizes the EPA toxicological endpoints of rotenone (from EPA 2007);

Exposure Scenario	Dose Used in Risk Assessment, Uncertainty Factor (UF)	Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (females 13-49)	NOAEL = 15 mg/kg/day UF = 1000 aRfD = 15 mg/kg/day = 0.015 mg/kg/day 1000	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049) LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		
Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = 0.375 mg/kg/day = 0.0004 mg/kg/day 1000	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain
Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity		

UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, aPAD = acute population adjusted dose, cPAD = chronic population adjusted does, RfD = reference dose, MOE = margin of exposure, NA = Not Applicable

Rotenolenoids are common degradation products found in the parent plant material used to make piscicidal forms of rotenone. The EPA (2007) concluded these degradation products are no more toxic than the active ingredient.

The EPA analysis of acute dietary risk for both food and drinking water concluded;

> *When rotenone is used in fish management applications, food exposure may occur when individuals catch and eat fish that either survived the treatment or were added to the water body (restocked) prior to complete degradation. Although exposure from this route is unlikely for the general U.S. population, some people might consume fish following a rotenone application. EPA used maximum residue values from a bioaccumulation study to estimate acute risk from consuming fish from treated water bodies. This estimate is considered conservative because the bioaccumulation study measured total residues in edible portions of fish including certain non-edible portions (skin, scales, and fins) where concentrations may be higher than edible portions (tissue) and the Agency assumed that 100% of fish consumption could come from rotenone exposed fish. In addition, fish are able to detect rotenone's presence in water and, when possible, attempt to avoid the chemical by moving from the treatment area. Thus, for partial kill uses, surviving fish are likely those that have intentionally minimized exposure.*
>
> *Acute exposure estimates for drinking water considered surface water only because rotenone is only applied directly to surface water and is not expected to reach groundwater. The estimated drinking water concentration (EDWC) used in dietary exposure estimates was 200 ppb, the solubility limit of rotenone. The drinking water risk assessment is conservative because it assumes water is consumed immediately after treatment with no degradation and no water treatment prior to consumption.*
>
> *Acute dietary exposure estimates result in dietary risk below the Agency's level of concern. Generally, EPA is concerned when risk estimates exceed 100% of the acute population adjusted dose (aPAD). The exposure for the "females 13-49 years old" subgroup (0.1117 mg/kg/day) utilized 74% of the aPAD (0.015 mg/kg/day) at the 95th percentile (see Table 5). It is appropriate to consider the 95th percentile because the analysis is deterministic and unrefined. Measures implemented as a result of this RED will further minimize potential dietary exposure (see Section IV).*

As for evaluating the human chronic risk from exposure to rotenone treated water, the EPA acknowledges the four principle reasons for concluding there is a low risk. First, the rapid natural degradation of rotenone. Second, using active detoxification measures by applicators such as potassium permanganate. Next, properly following piscicide labels which prohibit the use near water intakes. Finally, proper signing, public notification, or area closures which limit public exposure to rotenone-treated water.

As for recreational exposure, the EPA concludes no risk to adults who enter treated water following the application from by dermal and incidental ingestion but requires a waiting period of 3 days after a treatment before toddlers swim in treated water. The aggregate risk to human health from food, water, and swimming does not exceed the EPA level of concern (EPA 2007).

Recreationists in the area would likely not be exposed to the treatments because a temporary closure would preclude many from being in the area. Proper warning through news releases, signing the project area, road closure, and administrative personnel in the project area should be adequate to keep unintended recreationists from being exposed to any treated waters. If dead fish are lying on the shore in areas frequented by the public, they would be collected and removed from the site. Administering application in late winter or early spring of the year would further reduce exposure due to the relatively low number of users in this area.

Use for Prenfish ….Aside from the rotenone itself, liquid formulations [Prenfish] also consist of petroleum emulsifiers.
Finlayson et al. (2000) wrote regarding the health risks of these constituent elements:

> *" . . . the EPA has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans and the environment. The California Environmental Protection Agency found that adverse impacts from properly conducted, legal uses of liquid rotenone formulations in prescribed fish management projects were nonexistent or within acceptable levels (memorandum from J. Wells, California Department of Piscicide Regulation, to Finlayson, 3 August 1993). Liquid rotenone contains the carcinogen trichloroethylene (TCE). However, the TCE concentration in water immediately following treatment (less than 0.005 mg TCE per liter of water [5 ppb]) is within the level permissible in drinking water (0.005 mg TCE per liter of water, EPA 1980b). None of the other materials including xylenes, naphthalene, piperonyl butoxide, and methylnaphthalenes exceed any water quality criteria guidelines (based on lifetime exposure) set by the EPA (1980a, 1981a, 1993). Many of these materials in the liquid rotenone formulations (trichloroethylene, naphthalene, and xylene) are the same as those found in fuel oil and are present in waters everywhere because of the frequent use of outboard motors . . ."*

California Department of Fish and Game (CDFG, 1994) calculated that the maximum expected level of these contaminants following a treatment level of 2 ppm formulation are TCE 1.1 ppb; toluene 84 ppb; xylenes 3.4 ppb; naphthalene 140 ppb.

The product label states:

> *" . . . do not use dead fish for food or feed, do not use water treated with rotenone to irrigate crops or release within ½ mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond, or reservoir. . . . do not allow swimming in rotenone treated water until the application has been completed and all piscicide has been thoroughly mixed into the water according to the labeling instructions. This product is flammable and should be kept away from heat and open flame . . ."*

The occupational risks to humans is low if proper safety equipment and handling procedures are followed as directed by the product labels (EPA 2007). The major risks to human health from rotenone come from accidental exposure during handling and application. This is the only time when humans are exposed to concentrations that are greater than that needed to remove fish. To prevent accidental exposure to liquid formulated or powdered rotenone, the Montana Department of Agriculture requires applicators to be:

- Trained and certified to apply the piscicide in use
- Equipped with the proper safety gear, which, in this case, includes

- respirator, eye protection, rubberized gloves, hazardous material suit
- Have product labels with them during use
- Contain materials only in approved containers that are properly labeled
- Adhere to the product label requirements for storage, handling, and
- Application

There is an inhalation risk to ground applicators. To guard against this, ground applicators would be equipped with protective clothing, eye, and breathing equipment.

Use for Legumine ….Fisher (2007) conducted an analysis of the inert constituent ingredients found in the rotenone formulation of CFT Legumine for the California Department of Fish and Game. These inert ingredients are principally found in the emulsifying agent Fennodefo[99] which helps make the generally insoluble rotenone more soluble in water. The constituents were considered because of their known hazard status and not because of their concentrations in the Legumine formulation. Solvents such as xylene, trichloroethylene (TCE) and tetrachloroethylene are residue left over from the process of extracting rotenone from the root and can be found in some lots of Legumine. However, inconsistent detectability and low occurrence in other formulations that used the same extraction process were below the levels for human health and ecological risk. Solvents such as toluene, *n*-butylbenzene, 1,2,4 trimethylbenzene and naphthalene are present in Legumine, and when used in other applications can be an inhalation risk. However, because of their low concentrations in this formulation, the human health risk is low. The remaining constituents, the fatty acid esters, resin acids, glycols, substituted benzenes, and *1*-hexanol were likewise present but either analyzed, calculated, or estimated to be below the human health risk levels when used in a typical fish eradication project.

Methyl pyrrolidone is also found in Legumine. It is known to have good solvency properties and is used to dissolve a wide range of compounds including resigns (rotenone). Analysis of Methyl pyrrolidone in Legumine showed it represents about 9% of the formulation (Fisher 2007). The analysis concluded regarding the constituent ingredients in Legumine;

> *…None of the constituents identified are considered persistent in the environment nor will they bioaccumulate. The trace benzenes identified in the solvent mixture of CFT Legumine™ will exhibit limited volatility and will rapidly degrade through photolytic and biological degradation mechanisms. The PEGs are highly soluble, have very low volatility, and are rapidly biodegraded within a matter of days. The fatty acids in the fatty acid ester mixture (Fennodefo99™) do not exhibit significant volatility, are virtually insoluble, and are readily biodegraded, although likely over a slightly longer period of time than the PEGs in the mixture. None of the new compounds identified exhibit persistence or are known to bioaccumulate. Under conditions that would favor groundwater exchange the highly soluble PEGs could feasibly transmit to groundwater, but the concentrations in the reservoir, and the rapid biodegradation of these constituents makes this scenario extremely unlikely. Based upon a review of the physicalchemistry of the chemicals identified, we conclude that they are rapidly biodegraded, hydrolyzed and/or otherwise photolytically oxidized and that the chemicals*

pose no additional risk to human health or ecological receptors from those identified in the earlier analysis. None of the constituents identified appear to be at concentrations that suggest human health risks through water, or ingestion exposure scenarios and no relevant regulatory criteria are exceeded in estimated exposure concentrations…

The Legumine MSDS states "…when working with an undiluted product in a confined space, use a non-powered air purifying respirator…and… air-purifying respirators do not protect workers in oxygen-deficient atmospheres…" It is not likely that workers would be handling Legumine in an oxygen-deficient space during normal use. However, to guard against this, proper ventilation and safety equipment would be used according to the label requirements.

The advantage of CFT Legumine over Prenfish is that it has less petroleum hydrocarbon solvents such as toluene, xylene, benzene and naphthalene. By comparison, Prenfish has a strong chemical odor. CFT Legumine is virtually odor-free and performs almost identically to Prenfish.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira, et al. (1984) reported that the Indians extensively handled the plants during a mastication process, and then swam in lagoons to distribute the plant pulp. No harmful effects were reported. It is important to note that the primitive method of applying rotenone from root does not involve a calculated target concentration, metering devices, or involve human health risk precautions as those involved with fisheries management programs.

9. <u>COMMUNITY IMPACT</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. PUBLIC SERVICES/TAXES/UTILITIES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _______________		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				
f. Define projected maintenance costs		X				

11. AESTHETICS/RECREATION Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X		yes	See 11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c:
There would be a temporary loss of angling opportunity in any treated Gallatin Valley ponds between the time of fish removal and restocking. However, this project is specifically intended to protect wild trout fisheries and angling quality throughout the Upper Missouri River basin. The loss of fishing opportunity in Gallatin Valley ponds would be short term until appropriate fish species have been stocked. Any impacts to aesthetics would be short term and minor and be directly associated with the actual treatment and immediate aftermath including dead fish in the project area.

12. CULTURAL/HISTORICAL RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				12c
d. Will the project affect historic or cultural resources?		X				

Comment 12c:

The project site is located within the aboriginal range of several Tribes. To date there have been no cultural or religious resources identified at the project site. There would be no ground-breaking activities associated with this project, and no known cultural or religious ceremonies proposed for the same time this project is proposed. There would be no impacts to historical, cultural or religious values. This EA will be sent to Montana Tribes that would potentially have an interest in the project.

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?	X	X			yes	13e

f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)	X	X				13f
g. List any federal or state permits required.						13g

Comment 13d
FWP's plan is to eliminate the local sources of smallmouth bass in the Gallatin Valley to protect wild trout fisheries in rivers. If other harmful species are discovered in the future, FWP would likely propose a similar action if feasible to protect area wild trout fisheries.

Comments 13e and f
The use of piscicides can generate controversy from some people. Public outreach and information programs can educate the public on the use of piscicides. FWP anticipates some controversy and resistance, but also anticipates broad support given the risk smallmouth bass pose for wild trout fisheries in area waters, and the economic importance of those wild trout fisheries to the regional economy.

Comment 13g
The following permit would be required:

- DEQ 308 - Department of Environmental Quality (authorization for short term exemption of surface water quality standards for the purpose of applying a fish toxicant)

PART III. NARRATIVE EVALUATION AND COMMENT

This programmatic Environmental Assessment evaluates the impacts of using rotenone to remove smallmouth bass from Gallatin Valley ponds. All negative impacts would be successfully mitigated, and there would only be a short period of time where angling opportunity would be impacted. The proposed action evaluated in this Environmental Assessment is necessary to protect wild trout populations in Southwest Montana.

PART IV. PUBLIC PARTICIPATION

The public will be notified in the following ways to comment on this draft EA, the proposed action and alternatives:

1. Two public notices in each of these papers: The Bozeman Daily Chronicle and the Helena Independent Record.
2. Public notice on the Fish, Wildlife & Parks web page: *http://fwp.mt.gov*.
3. Copies of the EA will be available at the FWP Region 3 Headquarters in Bozeman and the FWP State Headquarters in Helena.
4. A news release will be prepared and distributed to a standard list of media outlets interested in FWP Region 3 issues.
5. Copies of this environmental assessment will be distributed to interested parties to ensure their knowledge of the proposed project.

Prepared by: Travis Horton   Date: 18 March 2019

Submit written comments to: Montana Fish, Wildlife & Parks
c/o Smallmouth Bass removal EA comments
1400 S. 19th Ave
Bozeman, MT 59718

e-mail address for comments

PART IV. REFERENCES

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